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(54) **Improved occluder for repair of cardiac and vascular defects.**

(57) A device (10) for the percutaneous transluminal repair of septal defects is disclosed. The device comprises first and second expandable occluders (12,14) fastened to each other, each occluder including a framework having a central hub (16) with elongated struts (18) radiating therefrom. The struts

are constructed such that they have a resistance to fatigue that exceeds the maximum fatigue stresses to which the struts will be subjected over a prolonged period in vivo. As such, the device exhibits a significantly decreased likelihood of metal fatigue failures after prolonged exposure in vivo.

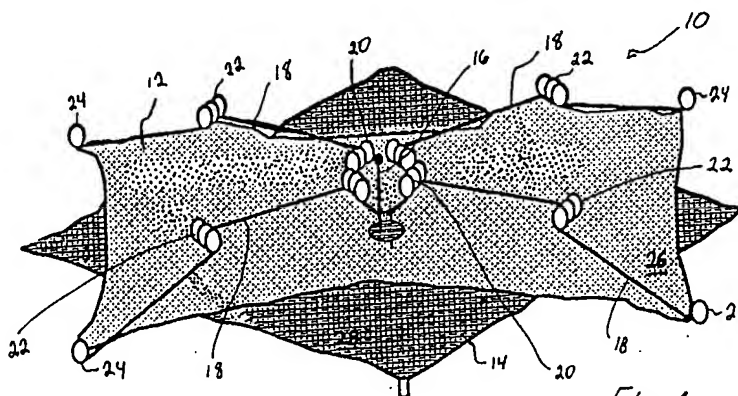


Fig. 1

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,X Y	US-A-4 007 743 (BLAKE) * abstract; figure 8 *	1-6 14-22, 27-34	A61B17/00
Y	CA-A-1 146 228 (MEDTRONIC) * page 2, paragraph 1 * * page 3, paragraph 1 *	14-22, 27-34	
A	US-A-4 142 531 (MAGOVERN) * column 3, line 3 - line 23; claim 1 * * column 6, paragraph 3; figure 7 *	14, 15, 27-29	
A	EP-A-0 159 753 (ASTRINSKI) * page 12, last paragraph - page 13, paragraph 1 *	16-19, 30-34	
A	DE-A-2 822 603 (THIERFELDER) * page 12, last paragraph; figures 12,8 *	7, 23	
A	CUBBERLY ET AL (ED) 'Metals Handbook, 9th ed, vol 3' 1980, AMERICAN SOCIETY FOR METALS, OHIO * page 213, column 2, last paragraph - column 3, paragraph 1 *	21	TECHNICAL FIELDS SEARCHED (Int. Cl.5) A61B
A	SIMS AND HAGEL (ED) 'The Superalloys' 1972, WILEY, NEW YORK * Section on heat treatment * * page 161 - page 165 *	20, 22	
A	FRICK (ED) 'Woldman's Engineering Alloys' 1990, ASM INTERNATIONAL, OHIO * page 425, column 1, last paragraph * (Note differing tensile and yield strength values)	16-18, 30-34	
The present search report has been drawn up for all claims			
Place of search THE HAGUE	Date of completion of the search 13 AUGUST 1993	Examiner BARTON S.	
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document			



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

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- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-A-3 116 462 (THIERFELDER) * page 7, paragraph 3; figures 2,3 * ---	7,9,23	
A	GB-A-1 169 419 (EDWARDS) * page 2, column 1, paragraph 2; figures 2,3 * ---	5	
A	US-A-4 629 458 (PINCHUK) * claim 25 * -----	23	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
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LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-13,23-26: Hinged structure for vascular defect occluder
2. Claims 1,14-22,27-34: Materials for vascular defect occluder frame

